



ISO Central Secretariat

date  
2000-12-06

reference  
ISO/VOTE/dn

SECRETARIAT OF ISO/TC 184/SC 4  
NIST/MSID  
Metrology, Room A127  
GAIITHERSBURG MD 20899,  
USA

Dear Sir or Madam,

**ISO/DIS 10303-50**

We have pleasure in enclosing the table of replies indicating the result of voting on the above draft, together with copies of all comments received. This table of replies will constitute annex A to the report of voting referred to in the ISO/IEC Directives (1995), Part 1, sub-clause 2.6.5.

The secretary is kindly requested to arrange for the attached form 13 'Report of voting' to be completed by the chairman to show the action to be taken with regard to further processing of this draft. Your attention is drawn to the ISO/IEC Directives (1995), Part 1, sub-clause 2.6.4 setting out the options available.

At the same time, the secretary is requested to prepare annex B to the report of voting, reproducing the comments received and giving the observations of the secretariat on each. For this purpose, please use the forms 'Report of voting'/Annex B which have been supplied to you separately.

In accordance with the ISO/IEC Directives, the Central Secretariat is required to circulate the full report to the P-members of your committee within three months. It is therefore essential that we receive from you the completed form 13, including annex B (comments and secretariat observations) by 2001-03-06.

In the case of a decision by the chairman to proceed with the publication, the FDIS should be prepared by the secretariat without delay (see also Council Resolution 2/2000), and should preferably be forwarded to the Central Secretariat at the same time as the report of voting.

Yours faithfully,

Sophie Clivio  
Standards Department

cc. Mme C. Hermetet-Filez (Secretary of ISO/TC 184) (without comments)  
Mr. Howard Mason (Chairman of ISO/TC 184/SC 4) (with comments)

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**REPORT OF VOTING ON ISO/DIS**

Closing date of voting	ISO/TC	/SC
Secretariat		

**1 Result of the voting**

The above-mentioned document was circulated to member bodies on the date shown in annex A, with a request that the Central Secretariat be informed whether or not member bodies were in favour of registration of the DIS as a Final Draft International Standard.

The replies listed in annex A have been received.

**2 Comments received**

See annex B. (This annex is circulated only to the P-members of the committee but is available to any other member body on request.)

**3 Observations of the secretariat****4 Decision of the Chairman**

- The DIS has been approved in accordance with the conditions of 2.6.3 of part 1 of the ISO/IEC Directives and will be submitted without change, other than editorial, for circulation as an FDIS to all member bodies.

In the light of technical comments received,

- a new DIS will be submitted to the Central Secretariat for circulation to the member bodies.  
 a new committee draft will be distributed for comment.  
 the DIS and comments will be considered at the next meeting.

Signature of the secretary

Date:

Signature of the chairman

Date:

DIS TABLE OF REPLIES / 2000-12-06 / TABLEAU DES REPONSES DIS

TC 184/SC 4  
TSO/DIS 10303-50

VOTING BEGAN ON/DEBUT DU VOTE:2000-06-29  
TIME LIMIT FOR REPLY/DELAI:2000-11-29

TITLE: Industrial automation systems and integration -- Product data representation and exchange -- Part 50: Integrated generic resource: Mathematical constructs

TITRE: Systèmes d'automatisation industrielle et intégration --  
Représentation et échange de données de produits --  
Partie 50: Ressources génériques intégrées: Constructions  
mathématiques

\* = Comments / commentaires

\* = Commissaire / Commissaires  
\*\* = P-member having abstained and therefore not counted in the vote /  
Membre (P) s'abstenant de voter; n'est donc pas compté dans le vote

P-MEMBERS VOTING: MEMBRES (P) VOTANT:	15	IN FAVOUR OUT OF EN FAVEUR SUR	15 = 100.00%	REQUIREMENT >= 66,66% CRITERE
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MEMBER BODIES VOTING:	NEGATIVE VOTES OUT OF		REQUIREMENT
0	16 = 0.00%	<= 25%	
COMITES MEMBRES VOTANT:	VOTES NEGATIFS SUR		CRITERE

THIS DRAFT HAS THEREFORE BEEN APPROVED  
in accordance with the ISO/IEC Directives, Part 1, sub-clause 2.6.3.

CE PROJET EST DONC APPROUVE  
selon les Directives ISO/CEI, Partie 1, paragraphe 2.6.3

## The Netherlands Issues on ISO 10303-50

ISSUE NUMBER: NL 50-01

AUTHOR: Andries van Renssen

CLAUSE: all

CLASSIFICATION: technical

DESCRIPTION:

Definitions of the entities and attributes shall contain a reference to their direct supertypes.

The direct supertypes of several defined objects is unclear as is indicated for some of them in the attached spreadsheet.

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-02

AUTHOR: Andries van Renssen

CLAUSE: all

CLASSIFICATION: technical

DESCRIPTION:

Entity and attribute names shall be in normal language whenever possible. This is not always the case with the current names. For example, the prefix 'maths\_' acts as a context and is not a natural part of a name. Therefore the prefix\_maths\_ should not be part of a name when not absolutely necessary.

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-03

AUTHOR: Andries van Renssen

CLAUSE: 3 and 4

CLASSIFICATION: technical

DESCRIPTION:

In clause 3 and 4 the same concepts are defined with sometimes the same names and sometimes different names and different definitions.

For example mathematical space (2 times) and math\_space (other examples are indicated in the attached spreadsheet).

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-04

AUTHOR: Andries van Renssen

CLAUSE: 3 and 4

CLASSIFICATION: technical

DESCRIPTION:

There is no fundamental distinction made between a mathematical quantities and mathematical functions. The latter can operate on mathematical quantities (and also on mathematical functions). Apparently because some mathematical functions can operate on mathematical functions. This seem to be based on a distinction according to the possible roles that things can play: a function can have a role as operand, whereas a definition should be based on what things are. So, we propose to introduce that distinction, based on things are.

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-05

AUTHOR: Andries van Renssen

CLAUSE: 3 and 4

CLASSIFICATION: technical

DESCRIPTION:

We generated a hierarchy for a part of the defined concepts as given in the attached spreadsheet (sheet 'Hierarchy'). This hierarchy is based on the subtype-supertype relations as defined in part 50 appended by the assumptions we made as given in the attached spreadsheet (sheet 'part 50').

We concluded that it was not possible to create a correct and unambiguous hierarchy from the subtype/supertype declarations in the definitions of the concepts in part 50.

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-06

AUTHOR: Andries van Renssen

CLAUSE: 3 and 4

CLASSIFICATION: technical

DESCRIPTION:

The subtypes of process are of the nature of activity. We support that assignments and operations belong to this. In this case they are mathematical processes. In a wider context they are subtypes of non-mathematical activities. Like with functions (see issue NL 04), where mathematical functions can also be seen as subtypes of a more generic function concept, we see no benefit in having this all grouped under one mathematical\_object supertype.

PROPOSED SOLUTION: (optional)

RESOLUTION:

ISSUE NUMBER: NL 50-07

AUTHOR: Andries van Renssen

CLAUSE: 3 and 4

CLASSIFICATION: technical

DESCRIPTION:

We are of the opinion that all entities (and attribute) should fit in one integrated hierarchy.

The attached spreadsheet presents (in sheet math02) other mathematical concepts.

Please indicate how the concepts in part 50 relate to those other concepts.

PROPOSED SOLUTION: (optional)

RESOLUTION:

-1	Version:	7-Nov-00			920.000		2. Association of Class of Info		
0	1	2	54	16	38		105	3	15
1	Assoc. id	Unique class id	Language of left hand term and definition	Subject area	Object type	Cardinalities	Class of object name (left hand term)	Association type	Unique wider id
15		920,121	English	mathematics	class_of_mathematical_object		mathematical function	is a specialization of a	920192
22		920,128	English	mathematics	class_of_mathematical_object		table function	is a specialization of a	920143
40		920,145	English	mathematics	class_of_mathematical_object		table function	is a specialization of a	920143
24		920,130	English	mathematics	class_of_mathematical_object		variable	is a specialization of a	920195
26		920,132	English	mathematics	class_of_mathematical_object		computable partial func	is a specialization of a	920134
25		920,131	English	mathematics	class_of_mathematical_object		mathematical function	is a specialization of a	920133
46		920,150	English	mathematics	class_of_mathematical_object		string	is a specialization of a	920186
50		920,153	English	mathematics	class_of_mathematical_object		elementary_space	is a specialization of a	920186
62		920,165	English	mathematics	class_of_mathematical_object		real interval	is a specialization of a	920186
70		920,172	English	mathematics	class_of_mathematical_object		tuple space	is a specialization of a	920186
78		920,178	English	mathematics	class_of_mathematical_object		empty value	is a specialization of a	920186
52		920,155	English	mathematics	class_of_mathematical_object		the_integers	is a specialization of a	920154
53		920,156	English	mathematics	class_of_mathematical_object		the_reals	is a specialization of a	920154
54		920,157	English	mathematics	class_of_mathematical_object		the_complex_numbers	is a specialization of a	920154
55		920,158	English	mathematics	class_of_mathematical_object		the_logicals	is a specialization of a	920154
56		920,159	English	mathematics	class_of_mathematical_object		the_booleans	is a specialization of a	920154
57		920,160	English	mathematics	class_of_mathematical_object		the_strings	is a specialization of a	920154
58		920,161	English	mathematics	class_of_mathematical_object		the_binaries	is a specialization of a	920154
59		920,162	English	mathematics	class_of_mathematical_object		the_maths_spaces	is a specialization of a	920154
60		920,163	English	mathematics	class_of_mathematical_object		the_generics	is a specialization of a	920154
80		920,180	English	mathematics	class_of_mathematical_object		the_empty_maths_tuple	is a specialization of a	920179
81		920,181	English	mathematics	class_of_mathematical_object		the_empty_maths_value	is a specialization of a	920179
82		920,182	English	mathematics	class_of_mathematical_object		the_empty_atom_based	is a specialization of a	920179
83		920,183	English	mathematics	class_of_mathematical_object		the_empty_atom_based	is a specialization of a	920179
39		920,144	English	mathematics	class_of_mathematical_object		subscript space	is a specialization of a	920198
21		920,127	English	mathematics	class_of_mathematical_object		parameter	is a specialization of a	920115
4		920,110	English	mathematics	class_of_mathematical_object		array function	is a specialization of a	920188
28		920,134	English	mathematics	class_of_mathematical_object		computable function	is a specialization of a	920188
29		920,135	English	mathematics	class_of_mathematical_object		partial function	is a specialization of a	920188
16		920,122	English	mathematics	class_of_mathematical_object		mathematical set	is a specialization of a	920193
18		920,124	English	mathematics	class_of_mathematical_object		mathematical space	is a specialization of a	920185
85		920,184	English	mathematics	class_of_mathematical_object		mathematical function	is a specialization of a	920185
51		920,154	English	mathematics	class_of_mathematical_object		elementary_space	is a specialization of a	920199
84		920,185	English	mathematics	class_of_mathematical_object		generic_expression	is a specialization of a	920189
8		920,114	English	mathematics	class_of_mathematical_object		expression	is a specialization of a	920189
23		920,129	English	mathematics	class_of_mathematical_object		tuple	is a specialization of a	920194
31		920,137	English	mathematics	class_of_mathematical_object		mathematical expression	is a specialization of a	920196
38		920,143	English	mathematics	class_of_mathematical_object		array function	is a specialization of a	920184
84		920,184	English	mathematics	class_of_mathematical_object		maths_function	is a synonym of	920184
19		920,125	English	mathematics	class_of_mathematical_object		mathematical value	is a specialization of a	920187
30		920,136	English	mathematics	class_of_mathematical_object		mathematical value	is a specialization of a	920187
17		920,123	English	mathematics	class_of_mathematical_object		mathematical space	is a specialization of a	920122
33		920,122	English	mathematics	class_of_mathematical_object		mathematical space	is a synonym of	920122
6		920,112	English	mathematics	class_of_mathematical_object		Cartesian product space	is a specialization of a	920124
7		920,113	English	mathematics	class_of_mathematical_object		compatible space	is a specialization of a	920124
12		920,118	English	mathematics	class_of_mathematical_object		function domain	is a specialization of a	920124
14		920,120	English	mathematics	class_of_mathematical_object		function range	is a specialization of a	920124
34		920,139	English	mathematics	class_of_mathematical_object		domain of a function	is a specialization of a	920124
35		920,140	English	mathematics	class_of_mathematical_object		range of a function	is a specialization of a	920124
36		920,141	English	mathematics	class_of_mathematical_object		space X	is a specialization of a	920124
37		920,142	English	mathematics	class_of_mathematical_object		space X1of one-tuple	is a specialization of a	920124
49		920,152	English	mathematics	class_of_mathematical_object		elementary_space	is a specialization of a	920124
61		920,164	English	mathematics	class_of_mathematical_object		real interval	is a specialization of a	920124
63		920,124	English	mathematics	class_of_mathematical_object		maths_space	is a synonym of	920124
79		920,179	English	mathematics	class_of_mathematical_object		empty value	is a specialization of a	920125
11		920,117	English	mathematics	class_of_mathematical_object		function application	is a specialization of a	920,200
84		920,190	English	mathematics	class_of_mathematical_object		quantifier operation	is a specialization of a	920,200

32		920.138					
27		920.133					
13		920.119					
44		920.148					
45		920.149					
10		920.116					
64		920.166					
65		920.167					
66		920.168					
67		920.169					
68		920.170					
69		920.171					
48		920.151					
47		920.150					
20		920.126					
41		920.145					
73		920.173					
74		920.174					
75		920.175					
76		920.176					
77		920.177					
71		920.172					
72		920.172					
84		920.186					
84		920.187					
84		920.188					
84		920.189					
84		920.191					
84		920.192					
84		920.193					
84		920.194					
84		920.195					
84		920.189					
84		920.197					
84		920.198					
84		920.199					
84		920.200					
5		920.111					
9		920.115					
42		920.146					
43		920.147					

Information content - text, including mathematical models & algorithms												
	205		4	6	14	8	9	10	11	12	13	
Cardinalities	Class of object name (right hand term)	Definition	Full definition	Classif. aspect	Remarks	Status	Date of start of life	Date of latest change	Date of end of life	Originator of latest change	Source	Dutch translation
	algorithm					proposed					ISO 10303-50-3.2.12	
	array function					proposed					ISO 10303-50-3.2.18	
	array function					proposed					ISO 10303-50-4.2.9	
	atomic expression component					proposed					ISO 10303-50-3.2.20	
	computable function					proposed					ISO 10303-50-4.2.1	
	computable partial function				sec 3.2.12	issue					ISO 10303-50-4.2.1	
	constant					proposed					ISO 10303-50-4.3.1	
	constant					proposed					ISO 10303-50-4.3.2	
	constant					proposed					ISO 10303-50-4.3.2	
	constant					proposed					ISO 10303-50-4.3.4	
	constant					proposed					ISO 10303-50-4.3.5	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	elementary_space					proposed					ISO 10303-50-4.3.2	
	empty value					proposed					ISO 10303-50-4.3.5	
	empty value					proposed					ISO 10303-50-4.3.5	
	empty value					proposed					ISO 10303-50-4.3.5	
	empty value					proposed					ISO 10303-50-4.3.5	
	finite Cartesian prod of finite intervals of integers					proposed					ISO 10303-50-4.2.8	
	free variable	in an expression				do free vari	issue				ISO 10303-50-3.2.17	
	function	whose domain is a Cartesian product of integers				proposed					ISO 10303-50-3.2.1	
	function	which is expressible in an algorithmic program				proposed					ISO 10303-50-4.2.1	
	function	which is not guaranteed to produce an output for				proposed					ISO 10303-50-4.2.1	
	fundamental aggregate object type					proposed					ISO 10303-50-3.2.13	
	generic_expression					proposed					ISO 10303-50-4.5.17	
	generic_expression					proposed					ISO 10303-50-4.5.30	
	generic_literal					proposed					ISO 10303-50-4.5.18	
	ISO13584-20 object					proposed					ISO 13584-20	
	language construct	composed of constants, variables, operators, qua				proposed					ISO 10303-50-3.2.5	
	linearly ordered aggregate mathematical object					proposed					ISO 10303-50-3.2.19	
	linguistic construct					proposed					ISO 10303-50-4.2.3	
	mathematical function					proposed					ISO 10303-50-4.2.8	
	mathematical function					proposed					ISO 10303-50-4.3.5	
	mathematical object				supertype:	proposed					ISO 10303-50-3.2.15	
	mathematical object				see 3.2.15	ignore					ISO 10303-50-4.2.2	
	mathematical set					proposed					ISO 10303-50-3.2.14	
	mathematical set				see 3.2.14	ignore					ISO 10303-50-4.2.5	
	mathematical space	consisting of all ordered tuples whose compone				proposed					ISO 10303-50-3.2.3	
	mathematical space	which intersection is not determined to be empty				proposed					ISO 10303-50-3.2.4	
	mathematical space					proposed					ISO 10303-50-3.2.9	
	mathematical space					proposed					ISO 10303-50-3.2.11	
	mathematical space	of all legitimate inputs of a mathematical functio				proposed					ISO 10303-50-4.2.6	
	mathematical space	of all possible outputs of a mathematical functio				proposed					ISO 10303-50-4.2.6	
	mathematical space					name and c issue					ISO 10303-50-4.2.7	
	mathematical space					definition t issue					ISO 10303-50-4.2.7	
	mathematical space					unclear def issue					ISO 10303-50-4.3.2	
	mathematical space					proposed					ISO 10303-50-4.3.2	
	mathematical space				see 3.2.14	: issue					ISO 10303-50-4.3.2	
	mathematical space					proposed					ISO 10303-50-4.3.5	
	mathematical value					proposed					ISO 10303-50-3.2.8	
	operation					proposed					ISO 10303-50	
	operation					proposed						

	definition issue	
ordered tuple	proposed	ISO 10303-50-4.2.4
partial function	proposed	ISO 10303-50-4.2.1
process	proposed	ISO 10303-50-3.2.10
process	proposed	ISO 10303-50-4.2.12
process	of forming an expression from a function and an proposed	ISO 10303-50-4.2.13
quantifier operation	proposed	ISO 10303-50-3.2.7
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
real interval	proposed	ISO 10303-50-4.3.3
string	is string co. issue	ISO 10303-50-4.3.1
string	proposed	ISO 10303-50-3.2.16
table function	proposed	ISO 10303-50-4.2.10
table function	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
tuple space	proposed	ISO 10303-50-4.3.4
mathematical object	undefined? proposed	ISO 10303-50
undefined?	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
generic_expression	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
language construct	undefined? proposed	ISO 10303-50
tuple	undefined? proposed	ISO 10303-50
mathematical object	undefined? proposed	ISO 10303-50
language construct	undefined? proposed	ISO 10303-50
process	which has been specifically referenced by a quar proposed	ISO 10303-50-3.2.2
variable	proposed	ISO 10303-50-3.2.6
variable	proposed	ISO 10303-50-4.2.11
variable	proposed	ISO 10303-50-4.2.11

	41	17	18	19	51	20	21	22	33	34	35
Table	Reference subject area	STEPLI b	POSC/ CAESA R class	POSC/ CAESA R assoc.	PIEBASE & JSTEP	STEP AP221	STEP AP227	STEP AP231	STEP AP202	STEP AP214	STEP AP225



26	29	37	39	40	23	24	25	27	28		
ISO 1998	ISO 14224	IEC	Maint. IMMS	Other ISO	EP COMS	NORSO K	EPON	Fresco	Capcost	Original Fresco key	Original Fresco subkey



TC 183/ISCC  
1D34352

## BSI issues on part 50 definitions

Number obj	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
	3.2.9		technical	Inputs to a function are not necessarily tuples.	Change the definition to: <b>function domain</b> mathematical space that contains all possible inputs to the function	
	3.2.9		technical	A function in this part of ISO 10303 can be a partial function. Hence each member of the domain is not necessarily a valid input to the function.	NOTE - A mathematical function in this part of ISO 10303 can be a <b>partial function</b> , i.e. a function that is not defined for each member of its domain.	
	3.2.9		technical	The term 'true domain' is used but is not defined in clause 3.	Add the definition: <b>true function domain</b> mathematical space that is all possible inputs to the function	
	3.2.11		technical	Outputs from a function are not necessarily tuples.	Change the definition to: <b>function range</b> mathematical space that contains all possible outputs from the function	
	3.2.11		technical	The range of a function is not all possible outputs but a set containing all possible outputs.	Add the definition: <b>function image</b> mathematical space that is all possible outputs from the function	
	3.2.12		technical	Function image is not defined.	Change the definition to: <b>mathematical function</b>	
				A function and an algorithm are quite different things.		
				A mathematical function in part 50 does		

Date: 2000-10-03 Document: ISO/DIS 10303-50

15:46

HEURE DE RECEPTION—23. NOV. —15:40— HEURE D'IMPRESSION—23. NOV. 15:46

Number body	Clauses/ sub-clause	Paragraph/ Figure / Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
				<p>not specify the algorithm that is used to evaluate it.</p> <p>Some useful application defined functions, such as the Dirac delta function, are not computable.</p> <p>The definition of a function as an algorithm conflicts with note 2 in clause 4.5.63.</p>	<p>mapping from the members of a mathematical space to members of a mathematical space</p> <p>NOTE - The mathematical space that the mapping is from is called the function domain. The mathematical space that the mapping is to is called the function range.</p> <p>NOTE - The function domain and the function range can be the same mathematical space.</p> <p>NOTE - A mathematical function can be defined by a rule.</p>	<p>Add the definition:</p> <p><b>computable mathematical function</b> mathematical function that can be computed by an algorithm</p> <p>Give a single definition for 'mathematical space' and 'mathematical set' as follows:</p> <p><b>mathematical space</b> mathematical set set of mathematical values</p> <p>NOTE - The term 'mathematical space' can imply a topological, metric, ordering or vector structure for the members. No such structure is implied by the use of the term in this part of ISO 10303.</p>
3.2.12	technical			<p>It is useful to refer to those functions that can be computed.</p>		
3.2.13 and 3.2.14	technical			<p>The term 'mathematical object' is undefined.</p> <p>If the terms 'mathematical space' and 'mathematical set' are synonyms in this part of ISO 10303, then this should be stated in the normative text rather than in a note.</p>		<p>The term 'parameter' is not always used with this meaning in this part of ISO 10303. In particular the attribute parameter of <b>application_defined_function</b> is not a free variable in an expression.</p>
3.2.17	technical					<p>Remove the definition and use 'free variable' where this is meant.</p>

Number body	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
3.2.x	3.2.x		editorial editorial	There should not be full stops at the end of clause 3 definitions.  All definitions fail the substitution test – the supplied text should be substitutable for the defined term in any sentence that uses the latter.	Delete the full stops.  Delete the initial indefinite article from each definition.	
4.5.63	NOTE 1		technical	The range and domain of an application_defined_function can be any maths space.	Change the explicit_domain and explicit_range attributes to reference maths_space.	
4.5.63			technical	Within part 50, a parameter attribute is not used to distinguish between different instances of maths_function within the same family.	Specify the value to be set for the parameter attribute if it is not used.	
4.5.63			technical	Another schema may take the same approach and not use the parameter attribute.	Preface the second sentence of note 1 by 'In this case'.	
4.5.63			technical	It is possible to distinguish between different types of application_defined_function by means other than the name of a subtype.	Remove the ABSTRACT SUPERTYPE from the entity definition. Add a description attribute.	
4.5.63			technical	It is possible to distinguish between different types of application_defined_function by means other than the specification of a subtype.	Add 'true function domain' to the	
				The term 'true mathematical domain' used in the informal propositions is		

## BSI issues on the extensibility of part 50 by other schemas

ember body	Clauses/ subclause	Paragraph/ Figure/ Table	Type of comment (general / technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
			undefined.	The term 'true mathematical range' used in the informal propositions is undefined.	definitions in clause 3.	
4.5.63		editorial		The significance of the formal propositions is unclear.	Add 'function image' to the definitions in clause 3, and use this term instead of 'true mathematical range'.	
4.5.64		technical		MathML is not a particular type of function but a language that can be used to define a function.	An improved definition is required.	
				MathML can also be used to define a <b>maths_space</b> or <b>maths_value</b> .	Remove the entity <b>mathml_function</b> , and replace by:	
				A function can have a description as MathML, a description as FORTRAN or both. There are many description languages.	<pre>ENTRITY mathematical_description; described : maths_value; describing : STRING; encoding : STRING; END_ENTITY;</pre>	
					An informal proposition should state that the <b>describing</b> should be a valid proposition in the language specified by the <b>encoding</b> . Hence:	
					<ul style="list-style-type: none"> <li>▪ if the <b>encoding</b> is 'mathml' then the <b>describing</b> is a well formed MathML document;</li> <li>▪ if the <b>encoding</b> is 'fortran' then the <b>describing</b> is a valid FORTRAN function.</li> </ul>	
					A note should point out that an AP or AM can specify the allowed values for encoding.	
		technical		A MathML string is UNICODE. Not all EXPRESS implementations may support this.	Add a note that says a MathML string is UNICODE.	
		editorial			There should be a normative reference to MathML and not just a bibliographic reference.	Add a correct normative reference.
4.5.64						
4.5.64						

Number body	Clauses/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
				The reference should be to the W3C approved definition of MathML and not to an earlier proposal.		
4.4.5, 4.4.6 and 4.5.37	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	<p>It is not possible to instantiate a complex number.</p> <p>This can be done in advance of EXPRESS 2 by means of a real pair.</p>	<p>Add the type:</p> <pre>TYPE maths_complex_as_pair = LIST [2,2] OF REAL; END_TYPE;</pre> <p>The name <b>maths_complex_as_pair</b> allows a future edition using an EXPRESS defined type COMPLEX.</p> <p>Also required are:</p> <pre>ENTITY complex_literal_tuple_as_pairs SUBTYPE OF (generic_literal); lit_value : LIST [1:?] OF maths_complex_as_pair; END_ENTITY;</pre> <p>and</p> <pre>ENTITY listed_complex_data_as_pairs SUBTYPE OF (explicit_table_function, generic_literal); values : LIST [1:?] OF REAL; DERIVE self\explicit_table_function.shape : LIST [1:?] OF positive := (SIZEOF {values}/2); END_ENTITY;</pre>	
4.5.48			technical			It should be possible to have Hermitian matrices as well as skew-symmetric

## BSI issues on complex numbers

Member body	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
4.6.85, 4.6.90, 4.6.109, and 4.6.110	4.4.16		technical	The functions pre-suppose a particular implementation of COMPLEX in EXPRESS 2.	The functions should be written for the current version of EXPRESS, and make no assumptions about future versions.	
		NOTE	editorial	A practical implementation of complex numbers should be provided using the current edition of EXPRESS.  In addition this note is inappropriate in an international standard – notes cannot predict what will or will not appear in future editions of standards	Remove the note.	

## BSI issues on the part 50 modelling approach

Member body	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
	General		technical	For most subtypes of mathematical function:	<ul style="list-style-type: none"> <li>- the range and domain are derived attributes; and</li> <li>- the function is given other explicit attributes that enable the range and domain to be derived.</li> </ul> <p>Two examples of this are:</p> <ul style="list-style-type: none"> <li>- An <code>explicit_table_function</code> has attributes <code>index_base</code> and <code>shape</code> that enable its domain to be derived. An more intuitive model would remove these attributes and specify the domain directly.</li> <li>- A <code>restriction_function</code> has an operand attribute that is a <code>maths_space</code>, with the domain and range derived to be identical. Again it would be more natural to</li> </ul>	

Number	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
4.5.30		technical		<p>specify the domain and range explicitly with a rule to say that they are the same.</p> <p>The domain and range attributes of a <b>maths_function</b> are now derived as <b>tuple_spaces</b>.</p> <p>Why are the domain and range restricted to be a <b>tuple_space</b> rather than the more useful (and expected) <b>maths_space</b>? This seems to eliminate the possibility of ever defining subtypes of <b>maths_function</b> with a simple domain or range, such as a finite real interval.</p> <p>Even with some of the simpler <b>elementary_function</b> examples, such as the <b>sine</b> function, the derivation of the domain confuses the reals R with a 1 component real cartesian product R<sub>1</sub> as a <b>uniform_product_space</b>.</p>	<p>Why has this approach been followed?</p>	
4.5.36		technical		<p>A constant function (i.e. a function that produces the same output for each input within its domain) is very useful in engineering.</p> <p>There is no constant function in the draft, but a <b>parallel_composed_function</b> can be kludged to look like one.</p>	<p>Remove the kludge and add a constant function.</p>	

## BSI issues on use of ISO 13584-20 by part 50

Number	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
4	general	technical		<p>The subtyping of entities from PLB part 20 by this part may introduce</p>		

Number body	Clause/ subclause	Paragraph/ Figure / Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
				<p>unforeseen complexities for APs and modules and for subsequent implementations. This will apply particularly when the external mapping is necessary for the instantiation of complex subtypes since PLIB introduces several subtypes without specific attributes.</p> <p>As an example, a <b>real_numeric_variable</b>, which is subtyped in part 50 is defined in ISO 13584-20 to be a subtype (after expanding the tree structures) of:</p> <ul style="list-style-type: none"> <li><b>numeric_variable</b>,</li> <li><b>simple_numeric_expression</b>,</li> <li><b>numeric_expression</b>,</li> <li><b>simple_generic_expression</b>, {twice}</li> <li><b>generic_variable</b>,</li> <li><b>generic_expression</b> {3 times}</li> </ul>		
4.5			technical	<p>The entity <b>maths_function</b> is defined to be a subtype of <b>generic_expression</b>. Various subtypes of <b>maths_function</b> are independently declared to be subtypes of <b>unary_generic_expression</b>, which is itself a subtype of <b>generic_expression</b>. Other subtypes are declared to be a subtype of <b>multiple_arity_generic_expression</b>.</p> <p>This seems over-complex, with dual inheritance.</p>		
4.5.11			technical	<p>The entity <b>maths_variable</b> is defined to be a subtype of <b>generic_variable</b> from PLIB part 20. As a <b>generic_variable</b> it inherits a requirement to be referenced by precisely one environment entity which,</p> <p>Consideration should be given to removing the <b>generic_variable</b> supertype reference. This applies also to specific references from the subtypes of <b>maths_variable</b> to other subtypes of <b>generic_variable</b>.</p>		

Number entry	Clauses/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
				<p>in turn defines the variable_semantics.</p> <p>For applications of part 50, in particular usage in part 5X and in various EACM modules, there may be conflicting requirements for the manner in which the 'environment' of a variable is defined. For example the environment for a number of variables could be defined for the maths_space, (referenced as the values_space attribute), rather than individually for each variable instance.</p> <p>There might even be a requirement for a variable instance to be used in more than one environment.</p>		

## BSI miscellaneous issues

Number entry	Clauses/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
	4.4.1 and 4.4.2		technical	The types nonnegative and positive are restricted to be integers, but this is not evident from the type names.	Rename the types to be nonnegative_integer and positive_integer.	
	4.2.12		technical	The procedure for evaluating a function stated in this clause is but one possibility.	This discussion should be made a note, or moved to an informative annex.	
				It is also possible for an implementation to provide a function that:		
				<ul style="list-style-type: none"> <li>▪ has a maths_value, maths_function pair as input and a boolean as output; and that</li> <li>▪ returns true if the maths_value is in the true domain of the function and false otherwise.</li> </ul>		
					The implementation could expect that a	

Number body	Clause/ subclause	Paragraph/ Figure/ Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
4.5.18			technical	check is made before each function evaluation, and invoke a software malfunction safe shut down procedure if a function is applied to a maths_value that is not in its true domain.	Specify a unique rule:  UR1 : space_id;	
4.6.85			technical	There is only one instance of an elementary_space such as 'the reals', but nothing prevents duplicate instances of the EXPRESS entity.	Having found the deliberate mistake, we hereby claim our prize.	
4.5.			technical	The function <b>fedex</b> should not be present.	Add entities to define this relationship between functions (or explain more clearly how this can be done if the capability already exists).	
			technical	How do you specify F over D, where:  D = A ∪ B; F(x) = G(x) for x ∈ A ∩ B; F(x) = H(x) for x ∈ B ∩ A; and either $A \cap B = \emptyset$ or $F(x) = G(x) = H(x)$ for $x \in A \cap B$ .	The parallel_composed_function approach seems more meaningful and if generally employed might eliminate or simplify some of the elaborate checks employed in other function subtypes	Change "must" to "shall" throughout
			technical	There is a distinct difference in the treatment of the inherited (from generic_expression subtypes) attributes of these entities. In repackaging_function and series_composed_function attributes are inherited but re-typed. In parallel_composed_function the attributes are explicitly given and the inherited attribute is then derived from them.	There are several cases where "must" is used where "shall" should be. See ISO/IEC Directives Part 3, Annex E	Review and reward definitions so that they state the nature of the information represented by the entity data type
	4.5.35, 4.5.36 and 4.5.37		editorial			
			editorial	Many definitions of entity data types are stated in terms of the intended use of the entity data type.		
			general			

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4.3	NOTE	editorial	Reference to Part 21 is incorrect. Last sentence of the note is inappropriate in an international standard.	Change "Part 21 files" to "ISO 10303-21 files". Delete the last sentence		

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4.5	minor, technical		No explicit entity types are defined for representing derivatives and integrals of functions. An AP could define such subtypes by subtyping and specializing application_defined_function, but such fundamental constructs deserve an explicit representation.	PROPOSED SOLUTION: Add two more subtypes of maths_function to explicitly represent these constructs: ENTITY partial_derivative_function n SUBTYPE OF (maths_function, unary_generic_expression); SELF\unary_generic_expression : maths_function; derivative_orders LIST [1:?] OF nonnegative; DERIVE fun maths_function SELF\unary_generic_expression : operand; WHERE WR1 : number_tuple_subspace_chec k(fun.domain); WR2 : number_tuple_subspace_chec k(fun.range); WR3 : SIZEOF(derivative_orders) = space_dimension(Fun.domain ); END_ENTITY;		

Number by line	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	Comment	Proposed change	Observations of the secretariat on each comment submitted
					Proposed change	
1y			Type of comment (general/ technical/editorial)	Comment	<pre> ENTITY   simple_integral_function     SUBTYPE OF       (maths_function,        unary_generic_expression);  SELF\unary_generic_expression :   operand;   maths_function;  lower_limit_neg_infinity :   BOOLEAN;  upper_limit_pos_infinity :   BOOLEAN;  DERIVE   integrand   :   maths_function :=    SELF\unary_generic_expression;   operand;   WHERE     WR1:     subspace_of_reals(integrand);     d.domain);     WR2:     number_tuple_subspace_check(integrand.range);   END_ENTITY; </pre> <p>The simple_integral_function is itself a function of 2, 1, or 0 real inputs, depending on the settings of the "limit" attributes. Most integrals of practical interest can be expressed by</p>	

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4.5.63			minor, technical	<p>It will be easier for APS to subtype and specialize "application_defined_function" if the type of its "parameters" attribute is changed from "maths_value" to "LIST OF maths_value". This type is already one of the possible types of "maths_value" (via "maths_tuple"), and any other single simple value can be adequately represented by a one member list of that value, so there is no change in the effective scope of the type.</p> <p>However, for complex technical reasons, the list type is much easier to work with in the anticipated applications</p>	<p>Change type of "parameters" attribute of "application_defined_function" from "maths_value" to "LIST OF maths_value".</p>	<p>simple_integral_function or iterates thereof. More advanced types of integrals (or derivatives) can be deferred until the application need is clearer.</p>

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					Proposed change	
4.5		minor, technical	"generic_literal" named "maths_tuple_literal" whose type "LIST OF maths_value".	There is no convenient way to communicate a tuple of values containing entity references as an object in a Part 21 file. The "atom_based_literal" type specifically excludes entity references. An instance of "finite_space" containing one member which is the desired tuple could be used, but this is somewhat kludgy. A "maths_tuple_literal" should be provided.	Add a subtype of "generic_literal" named "maths_tuple_literal" whose type "LIST OF maths_value".	
4.2		minor, technical		"Since schema constants cannot be referenced from Part 21 files, these constants are only useful within the formal specifications." It sounds as though the need to reference schema constants is a requirement that should be raised against Part 21.	Raise issue against Part 21 to amend Part 21 to allow	
4.4.10		minor, technical		"NOTE 1 The semantics of mathematical ordered tuple differs subtly from that of the EXPRESS list aggregate in that there are no notions of creation or destruction or element insertion or removal operations."		

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			Type of comment (general/ technical/editorial)	Comment	Proposed change		
4.4.11	Clause/ subclause	Paragraph/ Figure/Table	Would not the operations on a data type be dependent on the application and independent of the data model?	"The EXPRESS type "generic would be appropriate if it were allowed." Why not get the EXPRESS language modified to meet this requirement?	Raise issue against Part 11 to amend Part 11 to allow reference to GENERIC.		
4.4.13	minor, technical			This type...uses the device of making a list of exactly one element to make it a distinguishable type in the context of the select type prep function select. This modeling method is indirect. It would be better modeling style to model encoded_constant as an entity.	Make encoded_constant an entity.		
4.4.14	minor, technical			"...a positive encoded selector value represents the selection of the corresponding input, and a negative value represents the	Make encoded_selector an entity.		

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4.4.17	Clause/ subclause	Paragraph/ Figure/Table	Type of comment (general/ technical/editorial)	selection of the component of the first input, which must be a tuple." This modeling method is rather FORTRAN-like, and is not good modeling style.	corresponding rows, becomes [[1; 1; 1; 2]; [1; 3; 3]] of ordered triples, if ordered by columns, becomes [[1; 1; 1; 1; 2]; [1; 3; 3; 1; 2]]. And, if ordered by rows, becomes [[1; 1; 1; 2]; [1; 3; 3; 1; 2]].	Clarify	
4.5.42			minor, technical		The set [[2; 2; 2]; [1; 3; 1]; [1; 1; 1]; [2; 1; 2]; [1; 3; 3]] of ordered triples, if ordered by rows, becomes [[1; 1; 1; 2]; [1; 3; 3; 1; 2]]. This example is confusing. How does the original set of triples become two different sets? I thought there were only two orderings defined.	The "value_range" attribute is not described in the text. The values of the inherited derived "range" attribute should also be described in the text.	

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General		minor, editorial	Parenthesized phrases occur in normative text in various places in the document. Directives Part 3 do not allow parentheses in normative text, except for cross references.	Remove the parentheses or change to notes or examples, as appropriate.		
4.4.15		minor, editorial	"This select type enables a more efficient representation of an enormous variety of mathematical functions. In particular, it reduces the number of entity instances required." More efficient than what?	Say what this representation is more efficient than.		
4.4.19		minor, editorial	"A likely extension to this Part would be..." This is not the correct wording.	Change "this Part" to "this part of ISO 10303".		
4.6.11		minor, editorial	"Formaing" is not a word.	Change "Formaing" to "Forming"		